SPECIFICATIONS
GASTECH ENVIRONMENTAL MONITORS
TRACE-TECHTOR

			Standard	(Optional)
Serial No:	DT022	Ranges:	0-100 ppm	0-500
			0-1000 ppm	0-5000
			0-10,000 ppm	0-5,000
Sensor Type:	Catalytic	ALARMS:	100 ppm	500
			1000 ppm	2000
			2000 ppm	10,000
Calibration:	Hexane			

CONTENTS

TRACE-TECHTOR WITH METHANE RESPONSE SWITCH

I INTRODUCTION

This instrument is a standard Trace-Techtor with an added methane response switch. It is a toggle switch located on the top rear of the instrument. The switch changes the operating voltage of the sensor, which affects the response of the instrument to various gases. In the "FULL GAS RESPONSE" position, the sensor has full response to methane (CH_4). In the "NO METHANE RESPONSE" position, the sensor does not respond to methane, and response to certain other gases is also reduced or eliminated.

II. OPERATION

Set up, turn on, and warm up your instrument as described in the following instruction manual.

When to use the FULL GAS RESPONSE position:

When using the Trace-Techtor as a general hydrocarbon indicator, or when response to methane is desired.

When to use the NO METHANE RESPONSE position.

To detect hexane, BTX, and other petroleum-based hydrocarbons in environments where methane is or may be present, but where methane readings are not desired.

Note:

When switching between the FULL GAS and NO METHANE RESPONSE positions, allow two minutes for the sensor to stabilize, then re-zero in fresh air. It may also be necessary to adjust the Coarse Zero.

III. CALIBRATION

This unit was factory calibrated on hexane, with the switch in the NO METHANE RESPONSE position. When used in the FULL GAS RESPONSE position, the readings will be about 10% higher than NO METHANE RESPONSE readings.

For greatest accuracy, calibrate the Trace-Techtor on the gas (or vapor) to be detected, with the methane response switch in the desired position.

I. INTRODUCTION

The Trace-Techtor is a portable instrument for detection of hydrocarbon vapors over a broad range. It includes the following features:

Rugged water-resistant case

Sample-drawing configuration for testing confined spaces

Audible alarms for

- Low battery charge
- Low flow rate (also lights LED on control panel)
- High level of hydrocarbon vapor

Three ranges of detection

High-stability catalytic combustion sensor

An excellent application of the Trace-Techtor is to determine concentrations of petroleum-based hydrocarbon vapors in industrial and environmental operations. It can be useful for testing UST monitoring wells, soil samples, fugitive emissions, and many other applications where total petroleum hydrocarbon vapor levels need to be detected.

The Trace-Techtor is typically calibrated to hexane, which provides readings representative of total petroleum hydrocarbons. The standard unit is designed to have no response to methane (natural gas), to avoid unwanted and confusing readings from this gas. If methane response is desired, the Trace-Techtor can be supplied in a version that will respond to methane. Units which say "NOT FOR METHANE USE" on the lower right hand side of the meter dial do not respond to methane.

The "FULL RESPONSE" version of the Trace-Techtor is a good instrument to use for fugitive emissions testing, or as a general purpose hydrocarbon gas or vapor monitor. This version does respond to natural gas (methane) and therefore does not say "NOT FOR METHANE USE" on the meter dial. Standard calibration is hexane unless specified otherwise when ordered.

II. DESCRIPTION

A Housing

The Trace-Techtor has a fiberglass case which is durable, shock resistant, and water resistant. The lower half contains the battery, sensor, and sample drawing system; the upper half contains all of the electronic circuitry. A large handle makes the Trace-Techtor easy to carry and pick up. The lip of the upper case overlaps the lower, to shed water. Upper half is clamped to lower by a knurled screw.

B Combustible Gas Sensor

The combustible gas sensor is installed in an anodized aluminum reaction chamber by means of a threaded ring, and sealed by an o-ring gasket. The sample enters the chamber from the lower front, flows over the detector, and then exits the chamber.

The active detector element is coated with a platinum catalyst. An identical but non-catalytic reference element is mounted in the same environment to stabilize the measurement and compensate for effects of non-combustible gases, temperature variation, etc. Elements are protected by a sintered stainless steel flame arrestor, which prevents outward propagation of flame should an explosive atmosphere be sampled. Flame arrestor also acts as a diffuser to isolate elements from flow fluctuations.

Detector assembly connects to the circuit board at three screw terminals, accessible when upper half of housing is removed.

C. Meter

Hydrocarbon concentrations are displayed on a meter, visible through a window on the top face of the instrument case. The standard meter readout has a detection range of 0-100 ppm. When the selector switch is in the ppm range, meter readings are the actual gas concentrations. When the selector switch is in the PPM x 10 range, add one zero to the meter reading to get the actual PPM concentration. In the PPM x 100 range, add two zeroes to the meter reading to get the actual concentration.

A mark on the scale, "BATT CK" represents the minimum permissible battery voltage, as an indication of the state of charge of the battery.

D. Controls and Indicators

There are only two controls that are used during normal operation of the instrument—the selector switch and the zero adjustment. The selector switch turns the instrument on and off, selects the desired range, and tests the battery condition. The zero adjustment is used to adjust the meter to read zero in fresh air.

Additional internal potentiometer controls for span, coarse zero, and alarm settings are accessible on the circuit board and are described in later sections of this manual.

A red indicator light labeled "LOW FLOW" is located near the center of the control panel. If the sample flow ever drops below an acceptable level, this light will be lit and a steady audible alarm will sound. This function can be tested by blocking the sample probe inlet momentarily with your finger after the unit is warmed up.

E Recorder Output

Recorder output jacks are provided to connect to a recorder or data logging device, if desired. The output is 0-1.0 VDC, with 1.0 VDC corresponding to full-scale meter deflection on any of the three ranges available.

F Buzzer

The buzzer is mounted inside the instrument, and it sounds a steady or pulsed tone for the following conditions:

STEADY	PULSED
Low Battery	Vapor Alarm
Low Flow	
Improperly zeroed sensor	
Defective or disconnected sensor	

The pulsed vapor alarms may be disabled by the alarm cutout switch, which is a dip switch located directly behind the three alarm potentiometers on the circuit board. To disable, push switch #1 away from the #1 marking on the circuit board to the side of the switch labeled "ALM OFF". The steady tone alarms cannot be silenced since they are an indication that something is not working properly.

G Batteries

The battery pack, consisting of seven 3.5 ampere-hour nickel-cadmium cells in series, is secured within lower half of case. The cells are sealed as a unit, either with threaded bushings in bottom for clamping to instrument case, or with holes all the way through to accommodate 3" long screws and a hold-down bar. Power output (red and black) leads extend from front end of pack, and terminate in a plastic plug connector which mates with a connector wired to the main circuit board. A third orange wire is also present but has no function on this model. A similar connector at rear connects to the charger socket, so that battery may be unplugged at both ends for convenient removal. Current limiting resistors sealed into the pack limit maximum current that can be drawn on short circuit. Battery pack will power the instrument for approximately 10 hours. A "polyfuse", which operates as a fuse but which recovers when the overload is removed, is also sealed within the pack, and serves as an added protection against short circuit or overload. Some versions of battery pack contain a replaceable one amp fuse instead of a "polyfuse". To replace fuse, remove red fuseholder with screwdriver and replace with 1 amp 3AG fuse.

H Circuit Board

All circuit components are arranged on two epoxy glass printed circuit boards. The main board includes the power supply, the amplifier and alarm circuits, and associated controls. A second board (the switch board), is installed above the main board. The switch board is primarily related to the selector switch and is connected to the main board by three socketed ribbon cables. This board is inaccessible while the instrument is assembled, and it contains no user adjustments.

Five miniature adjustment potentiometers are provided on the underside of the main circuit card, available for user adjustment when the case is opened, by use of a small screwdriver.

a) PPM SPN, located near the front of the board, is used to adjust the PPM span or sensitivity, so that the instrument reads properly on a known gas sample. See CALIBRATION in section V. A. of this manual.

b) CRS ZER, located next to the PPM SPN potentiometer near the front of the board, is a coarse zero adjustment which is used if the sensor offset is out of range of the external zero adjustment. See ZERO ADJUSTMENT in section V.B. of this manual.

c) ALM (PPM x 1, PPM x 10, PPM x 100) adjustments are used to adjust the alarm settings in each of the gas ranges. See ALARM ADJUSTMENT in section V.C.2. in this manual.

2. Two miniature switches are also available. These are:

a) ALM ADJ switch, located in the center of the circuit board, is used when checking or adjusting alarm levels. See Alarm Level Verification and Adjustment in section V.C. of this manual.

b) Alarm cutout switch, labeled "ALM OFF" on one side and 1234 on the other, is located directly behind the three alarm potentiometers. This is a small four-pole dip switch. Only poles 1 and 2 are used in this version of the instrument. The pulsing audible vapor alarm is active when the small lever in position 1 is pushed towards the "1" imprinted onto the circuit board. The vapor alarms will be disabled if the lever is pushed away from the "1", to the far side of the switch labeled "ALM OFF" towards the instrument control panel. Pole 2 must remain in the far side position at all times for this instrument version.

WARNING

DO NOT LEAVE SWITCH 1 IN THE DISABLED POSITION IF AN AUDIBLE ALARM IS DESIRED.

I Sample System

Sample system consists of the components in flow path:

1. Probe is a 10" long 1/4" OD plastic tube with a dust filter chamber at the upper end, forming a handle. This filter chamber is transparent plastic, so the filter condition is easily visible. To replace filter, unscrew filter chamber where it connects to the knurled base.

2. Hose is a 5' flexible polyurethane tube. It has a male quick-connect coupling on one end to match inlet fitting of instrument. The opposite end has a threaded fitting to connect the probe.

3. Hydrophobic filter attaches directly to the front of the instrument with a quick connect fitting. It should always be used if there is any danger of sucking liquid into the unit. The hydrophobic filter stops water-based liquids, and also doubles as an additional dust filter. The hydrophobic filter is a disposable item. If it gets filled with water it can be removed, the water shaken out, and the filter can be re-used. If it gets clogged with dust or hydrocarbon liquids are sucked into it, the filter must be replaced. **Since the filter will not stop gasoline or other hydrocarbon liquids, care must be taken not to suck these liquids into the unit, since they can damage or contaminate flow components.**

4 Inlet fitting is a quick-connect female coupling on front of instrument. To release, pull back on the knurled outer ring and pull hose or hydrophobic filter out of the fitting.

5 Internal filter is a 0.2 micron dust filter and also is hydrophobic, which prevents it from passing dust or water that may damage the pump, flow switch, or sensor.

6. Pump is a DC motor driven diaphragm type. It operates directly from the battery whenever power switch is on.

7. Reaction chamber, is an anodized aluminum block that holds the detector in flow path of sample. Flexible tubes connect chamber to other internal flow components.

8. Flow switch is located on the upper side of the circuit board, and sample flow is routed to it with a tube to the upper case. The flow switch has no user adjustable parts and will trigger the circuitry to sound a continuous low flow alarm if the flow rate ever drops below about 0.25 cc/minute (0.5 scfh). To verify flow switch operation, temporarily block probe inlet with finger and alarm should sound. Alarm will clear when blockage is removed and flow resumes.

J Charger

The battery charger plugs into a polarized socket in the rear of the case. Charger provides a high current charge to the battery pack for a 16 hour period, and then cuts back to a sustaining charge. An amber light shows that the battery is receiving a charge. When complete, a green light shows that the battery is fully charged and ready for use.

K Continuous Operation

Instrument can be operated continuously from a 12 volt DC source, such as a 12 volt vehicle battery, by use of a Continuous Operation Adapter. This is a power cord with with a mating plug to fit the charger socket. When connected to instrument and to a 12 volt source, it will carry the load and tend to recharge the battery. It may also be used as a DC charger.

Adapter is furnished with a cigarette lighter plug to fit any negative-grounded vehicle with 12 volt battery. Order part number 47-1501.

An adapter for operation from 115V AC is also available. Order part number 49-2037.

WARNING

THE INTRINSIC SAFETY RATING OF THE TRACETECHTOR DOES NOT APPLY WHILE BEING OPERATED FROM AN EXTERNAL POWER SOURCE, OR WHILE CHARGING.

III OPERATION

A. Start Up

1. Attach hydrophobic filter, hose and probe to the inlet fitting on front of instrument.

2. Turn rotary switch to BATT CK. position and allow a 5 minute warm-up. Meter reading should be above the BATT CK. mark on the meter. If close to or below this mark, recharge battery before use.

3 Alarms heard during warm-up should be investigated. If pulsed alarm sounds, turn selector switch to PPM x 100 range and zero meter reading with external zero adjustment. If a steady alarm sounds, check for the following:

   a) Low battery. Turn selector switch to the BATT CK. position, and verify that meter reading is above the BATT CK. mark on the meter. If not, recharge battery before use.

   b) Below zero reading. Turn selector switch to PPM x 100 range and note if meter reading is below zero. If so, re-zero with external zero adjustment. If out of range of external adjustment, use internal coarse zero adjustment (see section V.B. of this manual).

   c) Defective sensor. If unit cannot be zeroed, sensor may be open or need replacement. Replace sensor and try again.

   d) Low flow. If the LOW FLOW light on side panel is lit, the flow is too low for the instrument to operate properly. Possible causes for a low flow condition are as follows:

      Clogged external filter or sample line. Disconnect the external hydrophobic filter and see if flow alarm silences. If it does, clear the hydrophobic filter of any water present by disconnecting it from the hose and shaking out any liquid. Also check that the hose or probe does not contain any dirt or other blockage. Replace filter if needed.

      2) Clogged internal filter. Remove and check the internal hydrophobic filter for water or dust clogging. Replace if required.

      3) Dirty or malfunctioning pump. If filter and tubing are all clear then pump may need to be cleaned, rebuilt, or replaced.

      4) If a non-water based liquid has been sucked into the unit recently, it is possible that the flow switch is damaged. To check flow switch connect a flow meter to the inlet and verify flow is less than 0.25 cc/minute (0.5 scfh). If flow switch is damaged, unit should be repaired before further use.

4 Test that flow system is fully functional by placing finger over inlet and verify that low flow alarm activates. Inlet should be checked with all sampling accessories connected (hose, probe, and hydrophobic filter), and finger placed over the probe tip. Allow a few seconds for flow alarm to activate when blocking inlet.

5. Adjust zero. After a five minute warm-up, or when reading in PPM range has stabilized, adjust the external zero knob to obtain a "0" reading. This must be done with selector switch in the PPM range, and with the probe sampling from a gas free location. If impossible to adjust the zero within the range of the external zero adjust potentiometer, adjust internal coarse zero adjustment (see section V.B. of this manual.).

6 Turn selector switch to desired range and hold hose inlet at point to be tested. Watch meter and note highest reading obtained. If meter reads over full scale, then move selector switch to the next position to change range to a less sensitive one. If reading rises above the alarm set point, a pulsed audible alarm will start, and will continue as long as reading remains above alarm point. After completing readings, purge instrument with fresh air before turning off.

Note

Because of the very high sensitivity of this instrument, the meter will tend to drift until sensor is thoroughly warmed up. Always let it run for 5 minutes or more, whenever possible, before operating on the PPM and PPM x 10 ranges. Take readings immediately after zeroing, and observe maximum deflection when sampling. It may be necessary to re-zero in fresh air periodically if using the instrument for many tests or for longer term testing throughout the day.

IV. INTERPRETATION OF GAS OR VAPOR READINGS

The PPM range is a very sensitive range, obtained by amplification of the signal from the catalytic element. Sensitivity is set for a direct reading in PPM of the gas for which the instrument is calibrated.

Even though the sensing element is compensated to minimize the effect of non-combustible gases, a residual effect is still observable in the sensitive ranges. The instrument may need to be re-zeroed if exposed to a gross change in humidity, or to a change in background level of CO_2 or other inert gas.

Most hydrocarbon gases or vapors will cause a response on the meter, but may not be direct reading. A hexane calibration provides a conservative reading representative of total petroleum hydrocarbon vapors present. If comparing these readings to another type of meter such as an FID or PID, you will find that the readings can be either higher or lower depending on several factors, such as the constituents of the hydrocarbon vapors, type of filters or lamps used, and gas used to calibrate the instruments. In general, the readings are a good indication of the level of hydrocarbon vapor contamination of the space being tested. When absolute levels are needed, samples must be tested in a qualified laboratory.

Soil contamination by hydrocarbon liquids can be tested by measuring the head space in a closed container half-full of soil. This test with any portable gas sensing instrument should be used only as a crude field indication of whether or not the soil is contaminated, and a soil sample should be sent to a laboratory for a more accurate determination of the contamination level. Any field gas detection instrument cannot be expected to provide the same reading as a laboratory tested soil sample, because they are not measuring the same thing. The gas or vapor detector can only measure hydrocarbons that have volatized or "evaporated" into a vapor state. Heavy hydrocarbons such as diesel or fuel oil do not fully evaporate at normal temperatures, so they will produce only relatively low levels of vapor (as compared to gasoline). A laboratory tested sample of diesel contaminated soil generally will indicate a much higher level of total hydrocarbons than a field vapor test may reveal, because the chemical extraction methods used for the laboratory test can also pick up the heavy hydrocarbons. Likewise, recent gasoline spills may reveal a higher field vapor reading than a laboratory soil sample test will produce.

V. CALIBRATION AND ADJUSTMENT

A. Calibration

Calibration of the Trace-Techtor should be checked periodically to assure proper response. Frequency of calibration depends on frequency and type of use the instrument receives. There is no set frequency of calibration that is correct for all users, so it is recommended that the unit be check fairly frequently at first (perhaps weekly) until a reasonable calibration need pattern is developed for your usage. For example, if the meter is used only once a month, then even monthly checks are not likely to be needed. The other extreme would be an instrument that is used constantly every day, and where the data accuracy is critical. Such frequent use in a critical application might demand the calibration be checked daily. Hexane is the recommended calibration gas, since it provides a conservative response representative of total petroleum hydrocarbon vapors present.

If the sensor is damaged or replaced, the unit should be recalibrated.

To calibrate:

1. Turn instrument on and allow at least a five minute warm up period. Verify battery is charged.
2. Open instrument case by loosening captive screw at front. Lift upper half of case slightly and move it 1/4" forward to disengage rear clamp, then separate the two halves. Locate the potentiometer on the front corner of the circuit board marked PPM SPN. This is the span adjustment.
3. Attach hose, probe, and hydrophobic filter to the instrument as it would be in normal operation.
4. Turn to PPM range and zero the meter using the external ZERO adjustment knob. If zero cannot be adjusted with the external adjustment, use the internal coarse zero adjustment. (See Section V. B.)
5. Attach upper end of flowmeter to the probe with the short piece of tubing included in the calibration kit. Note flowmeter reading.
6. Attach valve to cylinder and flowmeter to valve with the remaining tubing. Open valve just enough so that flow is the same as observed in step 5.
7. Watch meter and note highest reading. The desired reading is the PPM value marked on the calibration gas cylinder. (Selector switch should be in the appropriate position to read the concentration marked on the cylinder.) If the reading does not match the cylinder value, turn PPM SPN adjustment to give desired reading.

   Calibration kits and replacement cylinders are available from Gastech Environmental Monitors. The recommended cylinder is part number 81-0007E, which is a cylinder of nominal 40% LEL hexane marked with its PPM value, nominally 4400 PPM.

   Calibrate the unit with a concentration in excess of 1000 ppm, to minimize any calibration error that may occur due to humidity effects caused by the dry air which comes out of a compressed gas cylinder.
8. If zero cannot be adjusted, or if reading cannot be set high enough, replace detector.

B Zero Adjustment

This instrument contains both an external fine zero adjustment and an internal coarse zero adjustment. Generally the external adjustment is all that is needed, but when replacing sensor or as sensor ages, it may become necessary to adjust the internal coarse zero. This potentiometer is accessible with the instrument opened and is located on the front of the circuit board labeled CRS ZER. Adjust as follows:

Turn instrument on and allow at least a five minute warm-up period.

2 Turn the external zero adjustment to the center of its adjustment range. This is a 10 turn adjustment, so count 5 turns from one end of its range. (First turn it fully clockwise and then back it off 5 full turns counterclockwise.)

3 Turn selector switch to PPM range.

4 Turn internal CRS ZER adjustment to bring the meter to a zero reading. Turning the adjustment clockwise increases the reading.

5 If unable to adjust meter to zero with the CRS ZER adjustment, sensor wires may be loose or sensor may need replacement

C. Alarm Level Verification and Adjustment

The Trace-Techtor contains individually adjustable gas or vapor alarms for each of the three ranges. These alarms are inactive for the first 30 seconds following turn on. See the Specifications at the front of this manual for alarm setting for this instrument.

Note

2000 ppm for hexane is roughly the same as 20% LEL hexane. Both versions of this instrument have a 2000 ppm alarm to alert the user that the concentration is approaching a flammable condition.

WARNING

ON THE 50,000 PPM UNIT, THE 10,000 PPM ALARM POINT INDICATES THE SAMPLE MAY BE TO A FLAMMABLE LEVEL ALREADY. USE EXTREME CAUTION WHEN SAMPLING SUCH AREAS TO AVOID POSSIBLE IGNITION OF THE TEST SPACE. ANY POSSIBLE IGNITION SOURCE, SUCH AS SPARKS, MATCHES, TORCHES, CIGARETTES, VEHICLES, ETC. MUST NOT BE USED NEAR A FLAMMABLE AREA.

The Trace-Techtor is designed to be intrinsically safe for use in Class I, Div. 1, Group C and D hazardous atmospheres, so if used properly it cannot be a source of ignition in these atmospheres.

Alarm Verification

Alarm levels can be checked with the ALM ADJ switch. It is located in the center of the circuit board, accessible when the instrument is open. To check alarm levels:

a) Separate top and bottom halves of instrument housing by loosening the large knurled screw near the front of the housing.

b) Turn instrument on and allow to warm-up.

c) Move selector switch to PPM range, and then press and hold the ALM ADJ switch.

d) Observe meter reading. Meter reading will read the level at which the alarm point is set.

e) Turn the selector switch to PPM x 10 and PPM x 100, and repeat the above (press ALM ADJ switch and observe meter reading) for these ranges.

2 Alarm Adjustment

Alarm levels are adjustable with the ALM ADJ switch and the ALM potentiometers. Alarm levels are factory-set at the levels shown in Specifications, but can be field adjusted as follows:

a) Follow steps a through d of the preceding Alarm Verification section.

b) While observing meter reading of alarm set point for PPM range, turn the adjustment potentiometer marked PPM x 1 located directly behind the ALM ADJ switch. Turning this adjustment will move the meter dial to a new alarm setting. Stop turning when meter displays the desired alarm level setting.

c) Repeat step b for PPM x 10 and PPM x 100 ranges; move the selector switch to those ranges and turn their respective alarm adjustment potentiometers to display the desired settings.

3 Alarm Cutout

An alarm cutout switch is provided in the event the instrument will be used as a survey tool only and no gas level alarms are desired. The alarm cutout switch is unlabeled and is located directly behind the three alarm adjustment potentiometers. This is a small four pole switch which utilizes only poles 1 and 2. The pulsing audible vapor alarm is active when the small lever in position 1 is pushed near the "1" imprinted onto the circuit card. The vapor alarms will be disabled if the lever is pushed away from the "1" to the far side of the switch labeled "ALM OFF", towards the instrument control panel. Pole "2" must remain in the ALM OFF position at all times for this instrument version.

WARNING

DO NOT LEAVE THE SWITCH IN THE DISABLED POSITION IF AUDIBLE VAPOR ALARMS ARE DESIRED.

VI. MAINTENANCE

A Batteries

1 To check battery voltage, turn the selector switch to BATT. Recharge before voltage reads minimum. To charge:

a) Turn selector switch to BATT position and note meter reading.

b) Plug charger into power source and then into the socket on the rear of the Trace-Techtor. The meter reading should rise slightly as soon as charger is connected. If it does not, verify that AC outlet is active. If outlet is active but meter does not rise when charger is attached, charger may be defective.

c) If meter reading does rise, turn instrument off and leave on charge for 16 hours.

Note

Do not attempt to charge while instrument is turned on.

Charger provides a dual rate, timed charge. The amber LED lights when the instrument is charging. After 16 hours the green LED on the charger will light, indicating that charging cycle is complete.

2. If sufficient voltage cannot be obtained after charging, open instrument and

a) Check voltage output with a voltmeter, between red and black wires (unplug connector to gain access to pins). Voltage should be about 8.5 volts.

b) If battery voltage is too low, and cannot be brought up by overnight charging, battery probably needs replacement. To remove, take out the two screws holding it to bottom of case, and unplug black and orange wire connector and charging end.

c) If battery has no output and is the fused version, replace fuse. Remove existing fuse by unscrewing the red fuse holder on the battery with a screwdriver. Replace only with 1 AMP 3AG type fuse.

B Combustible Detector

1 Sensor assembly may require replacement if:

a) Meter cannot be set to zero within range of internal coarse zero potentiometer.

b) Meter cannot be set to desired level within range of SPAN adjust.

2 To Replace Detector:

a) Open instrument case.

b) Disconnect the red, green and white wires at terminals on main circuit board, noting color coding.

c) Unscrew knurled retaining cap at reaction chamber.

d) Pull out original detector and install new one Be sure that o-ring is in place, under flange of detector.

e) Connect wires to terminals, turn power on, zero and calibrate new sensor after warm up.

C Meter

If meter is damaged it can be removed for repair or replacement as follows

1 With upper half of instrument removed from lower half and inverted, remove three screws holding circuit board to case.

2 Gently lift circuit board with meter out of case. Circuit board will remain attached to case by three ribbon cables.

3 Remove two nuts holding meter to circuit board, then remove meter.

4 Re-install new meter in reverse order of the above steps.

D Circuit Board

Main circuit board can be removed by following the above steps 1-3 for meter removal and adding these additional steps:

Remove three connecting ribbon cables by unplugging from sockets on main board. Prying loose from sockets carefully with a small screwdriver can aid this step.

2 Remove tubing to bottom case at the quick disconnect fittings located in the bottom case. To remove, push the red flange into the fitting while pulling tube with other hand. Take note of which tube goes where.

3 Return defective circuit board to the factory for repair, or purchase new circuit card for replacement.

Note

When returning to factory for repair, please be sure problem has been narrowed down to the main circuit board, otherwise it is better to send in the complete top case assembly or the entire instrument for checkout.

E Filters

There are three filtering stages used in the Trace-Techtor. They should all be maintained in good condition because their function is to protect other internal components from damage or unnecessary maintenance.

Probe filter is a cotton ball located in the clear plastic portion of the probe. It captures dust and other debris to prevent it from entering the hose. It is not a moisture trap. Periodically inspect to verify that this cotton ball is clean. To replace, unscrew probe body from probe base, remove dirty cotton ball, insert a new cotton ball and re-assemble. Cotton balls may be purchased from Gastech Environmental Monitors or any drug store.

2 External hydrophobic filter attaches directly to the front of the instrument with a quick connect fitting, and the hose attaches to the hydrophobic filter. This filter prevents water-based liquids from entering the instrument and possibly damaging the sensor or other internal components. It also further filters dust particles from the gas stream.

This disposable filter should be replaced it if collects excessive amounts of dust, if hydrocarbon liquid is sucked into it, or if it is physically damaged. If water is sucked into it, remove the filter, shake the water out, and then re-install filter.

3 Internal hydrophobic filter is located in the lower portion of the instrument and is accessible when the instrument is open. The purpose of this filter is to provide one last filtering stage for both water and dust before the sample flow passes on to the pump, sensor, and flow switch.

This filter can be replaced by disconnecting it from the yellow tubing sections and re-installing a new one. When installing new one, be sure the side of the filter marked "INLET" is facing towards the front of the unit and is connected to the hose leading to the inlet fitting.

CAUTION

Gasoline or other hydrocarbon based liquids can cause damage to hose, filters, and internal components.

F Pump

Pump used is a DC motor driven diaphragm type. It should have long life, (several years in normal operation) but it may lose efficiency if dirt or liquid is drawn in and collects under the valves. Verify proper pump operation periodically by taking a sample and observing time for initial gas response to occur. This should be within 5 seconds for a 5' hose. It may also be checked with the flowmeter provided as a calibration accessory. Normal pump flow is generally about 2.0 SCFH.

If pump needs servicing, remove it by unscrewing two small screws holding it in the bottom of the case. Pump can be returned for repair on an exchange basis or it can be disassembled and cleaned. Replacement pump head assemblies are also available.

VII. PRECAUTIONS AND NOTES ON OPERATION

A Heated Samples

When sampling spaces that are warmer than the instrument (hot tanks), condensation can occur as the sample passes through the cooler sample line. Water vapor condensed in this way can block the flame arrestor and interfere with pump operation, unless a hydrophobic filter is used.

If heated hydrocarbon vapors of the heavier hydrocarbons (flash point 90 degrees Fahrenheit or above) are present, they may also condense in the sample line and fail to reach the filament. Thus an erroneous low reading may be obtained.

B Filament Poisoning

Certain substances have the property of desensitizing the catalytic surface of the platinum filament. These substances are termed "catalyst poisons" and can result in reduced sensitivity or in failure to give a reading on samples containing combustible gas. The most commonly encountered catalyst poisons are the silicone vapors, and samples containing such vapors even in small proportions should be avoided.

Occasional calibration checks on known gas samples are desirable, especially if the possibility exists of exposure to silicones.

C Other Gases and Vapors

The instrument is designed and calibrated specifically for hexane unless specified differently in the original order. It can be recalibrated and used on other gases and vapors, by proper use of the calibration control while sampling a known gas-air mixture.

Note

The Trace-Techtor cannot be used for methane or natural gas detection unless specifically provided for that use by the factory.

D. Oxygen Deficient Mixtures

Samples which do not have the normal proportion of oxygen may tend to read low because there is not enough oxygen to react with all combustible gas present in the sample. As a general rule, samples containing 10% oxygen or more have enough oxygen to give a full reading on any combustible gas sample up to 10,000 PPM. For lower concentrations of flammable gas, lower levels of oxygen are required for full response. If oxygen deficiency is suspected of a test space, a dilution fitting (Part No. 80-0403) should be used in order to get an accurate measurement.

E Arson Investigation

Flammable liquids (gasoline, kerosene or paint solvent) are often used in starting intentional fires. Investigation of such fires can be greatly aided if the presence and location of such liquids can be determined at the site, as soon as possible after the fire is extinguished. The Trace-Techtor can be of great assistance in making this determination.

In testing for residual flammable liquids, look for places where the liquid could have been trapped and where it might remain even after the fire. Naturally, if the entire structure has been consumed there is little likelihood of any liquid or vapors remaining. Conversely, the earlier the fire has been extinguished, the greater the chance of finding significant amounts of liquid remaining.

To check for residual volatile liquids, set the instrument up in accordance with the preceding instructions and, allow it to run for at least 5 minutes. Then turn to PPM range and balance zero carefully immediately before taking the test.

Hold end of probe at point where vapors may be present, and watch meter carefully for any sign of a deflection. Check at joints or cracks between boards, for example, under baseboards or plates in contact with flooring. Pry boards up to form a small crack where hose or probe may be inserted. Check also under unburned portions of rug or upholstery, or any point where liquid might logically have soaked in and remained.

If a positive indication is obtained, trace it to the point of maximum reading. This is the point where samples should be taken for further lab analysis.

VIII. PARTS LIST

Stock No.	Description
07-6010	O-Ring Seal, hose (probe end)
07-6115	O-Ring Seal, combustible detector
30-0018	Pump, Gilian
30-0018E	Pump, Gilian, exchange
30-0021	Repair kit for Gilian Pump
33-0153	Filter, internal, hydrophobic
33-1031	Filter for probe, pkg of 24 cotton balls
47-1501	12 VDC Adapter/Charger
49-1571	Battery Pack, encapsulated with Ni-Cad batteries
49-2037	115 VAC Continuous Operation Adapter
49-2133	Battery Charger, 115 volts, dual-rate time controlled
49-2034	Battery Charger, 230 volts, for Ni-Cad batteries (single rate)
49-2134	Battery Charger, 230 volts, dual rate time controlled (user to provide AC plug)
49-8051	Battery Pack, Ni-Cad, replaceable cell type
50-5801E-A2	Meter, 0-100 PPM scale (No CH_4)
50-5801E-A4	Meter, 0-500 PPM scale (No CH_4)
61-0120TT	Detector Ass'y Catalytic, selected for Trace-Techtor
80-0150	10" Probe
80-0155	Probe, 30", aluminum
80-0224	Filter, external, hydrophobic w/ quick disconnect ftgs.
80-0403	Dilution fitting, 50/50
80-0800E-5	Hose, Polyurethane, inlet 5'
80-0800E-10	Hose, Polyurethane, inlet 10'
80-0800E-15	Hose, Polyurethane, inlet 15'
80-0800E-20	Hose, Polyurethane, inlet 20'
81-0007E	Spare cylinder of 4400 PPM hexane
81-0012E	Cylinder of 25,000 ppm methane in air
81-0086E	Cylinder of 5000 ppm methane in air
81-0221E-2	Calibration Kit for Trace-Techtor, w/2 cyl. of 4400 PPM hexane

SERVICE POLICY

GasTech Inc. maintains an instrument service facility at the factory. Some GasTech distributors also have repair facilities; however, **GasTech assumes no liability for service performed by other than GasTech personnel.** Should your instrument require non-warranty repair, you may contact the distributor from which it was purchased, or you may contact GasTech directly.

If GasTech is to do the repair work for you, you may send the instrument, prepaid to GasTech Inc. 8445 Central Avenue, Newark, CA 94560, Attn: Service Department. Always include your address, purchase order number, shipping and billing information and a description of the defect as you perceive it. If you wish to set a limit to the authorized repair cost, state a "not to exceed" figure. If you must have a price quotation before you can authorize the repair cost, so state, but understand that this involves extra cost and extra handling delay. GasTech's policy is to perform all needed repairs to restore the instrument to full operating condition, including reactivation of all out-of-warranty electrochemical cells.

To expedite the repairs operation, it is preferable to call in advance to GasTech Instrument Service, (510) 794-7015, obtain a Return Authorization Number (RA#), describe the nature of the problem and provide a purchase order number.

If this is the first time you are dealing directly with the factory, you will be asked to provide credit references or prepay, or authorize COD shipment.

Pack the instrument and all its accessories (preferably in its original packing). Enclose your Purchase Order, shipping and billing information, RA#, and any special instructions.

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